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REPORT OF

**MARKET FOR AMMONIA  
IN  
INDUSTRY IN VENEZUELA**

FOR

**THE CREOLE PETROLEUM CORPORATION**

BY

**Pennsalt Health, Agriculture and Industrial Service**

Widener Building  
Philadelphia 7, Pa., U.S.A.

(PHAIS)

Cables:  
PENNSALT

JULY 20, 1954

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*Project NS Venezuela*

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SECTION I - INTRODUCTION

A statement of the purpose  
of the PHAIS survey -

The services of Pennsalt Health Agriculture And Industrial Service were contracted to conduct a study to determine the present and potential market for ammonia in industry in Venezuela.

This was done by the PHAIS Market Research Method, which adapts the techniques developed by Pennsalt in the United States to meet the conditions of less industrialized areas.

SECTION II - FINDINGS AND CONCLUSIONS

A statement of the present and potential ammonia market in Venezuela.

The findings on the consumption of ammonia and its equivalents, in industry coincided in general with the official Venezuelan industrial import statistics for nitrogenous materials, which is an index of consumption.

The Venezuelan import statistics show that 1,741 metric tons (see Chart #6) of industrial ammonia and ammonia-bearing products, expressed in terms of ammonia, were imported during 1953. The figures from PHAIS's research and calculations show that the amount of industrial consumption of ammonia and ammonia-bearing products in terms of equivalent ammonia was 2,280 metric tons for 1953.

From contacts with suppliers of the Venezuelan market and with the industries visited in Venezuela and from the analysis and evaluation of the market and available statistical information, it is indicated that, with the advent of locally-available ammonia, up to 3,400 metric tons per year could be marketed within five years' time.

The chart below shows, in metric tons of equivalent ammonia, those ammonia and ammonia-bearing products which were consumed in 1953 and a projection of those figures as a result of the survey's findings giving the amounts of the same products which, it is indicated, would be consumed in five years' time. The agricultural market is reported on separately and is excluded from these figures.

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ESTIMATED AMMONIA CONSUMPTION  
IN VENEZUELA  
EXCLUSIVE OF AGRICULTURE

|                             | 1953  | 1958   |
|-----------------------------|---|--|
|                             | Figures in metric tons<br>of ammonia equivalents. | Figures in metric tons<br>of estimated ammonia<br>equivalents. |
| Explosives                  | 1,300   | 1,600 - 1,900  |
| Anhydrous &<br>Aqua Ammonia | 315   | 350 - 370  |
| Urea                        | 615   | 950 - 1,005  |
| Ammonia Salts               | 35  | 60 - 90  |
| Nitric Acid                 | 15  | 25 - 40  |
| TOTAL                       | 2,280   | 2,985 - 3,405  |

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SECTION III - PROCEDURE - THE PHAIS METHOD

A detailed report of the  
PHAIS method of operation.

The PHAIS method of market research consists of three phases:-

A - A study of all pertinent available statistics from various sources.

In order to acquire a sound statistical basis to coordinate with findings of the other phases of the survey all pertinent available statistical data were studied thoroughly.

1 - In Venezuela

The sources of information included:

- a - Statistical publications and general Informational Releases relating to importation, of the Office of Statistics, a division of the Ministry of Development.
- b - Various pertinent records of the steamship companies, representative of the major port areas in Venezuela.
- c - Recorded freight movement data from various freight forwarders files representative of the major freight handlers in Venezuela.
- d - Statistical import information of general distribution agencies handling large quantities of imports.
- e - Statistics compiled by commercial attaches of Embassies representing those countries which account for the major Venezuelan imports.

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2 - In the United States

In order to broaden the fund of significant statistical information relating to Venezuelan imports, various sources in the United States were investigated. These investigations were conducted as an aid in the supplementary determinations of the amounts of ammonia and ammonia-containing products being shipped to Venezuela and a supplementary aid for the projection of these figures for an estimation of the amounts of these products which it could reasonably be assumed would be utilized within the next five (5) years, assuming local availability of ammonia.

These various sources included:

- a - The statistical information and publications of the appropriate divisions of the U. S. Department of Commerce.
- b - Pertinent record files of the major steamship companies in the U. S. which ship the majority of the overall tonnage of Venezuelan imports.
- c - Freight movement data from the files of freight forwarders and shipping agents who handle annually large tonnages of Venezuelan imports.
- d - Statistics compiled by various commercial groups relative to Venezuelan imports and exports.

B - Field Work - Interviews with present and potential consumers.

1 - In Venezuela -

Bilingual market research experts were assigned to the survey



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in Venezuela to implement this phase of the PHAIS method.

The field work, or contact interviews by the PHAIS bilingual market research team members consisted of interviews with the Purchasing Agent, Manager of Operations and Planning or the policy making executive or their counterparts in all the industries now using or planning to utilize Nitrogenous products.

The industries surveyed by this contact interview method are as follows:

a. Petroleum Companies -

The oil companies were interviewed at their main offices in the cities of Caracas and Maracaibo.

b. Textile Industry -

The largest textile manufacturers and a cross-section of all the lesser manufacturers were interviewed.

c. Food Processors - Human and Animal -

All manufacturers in the industry were interviewed.

d. Soap Industry -

A representative cross-section of all manufacturers were interviewed.

e. Metal Industry -

- 1) Metal treating plants were interviewed.
- 2) Metal fabricating plants were interviewed.
- 3) Automobile assembly plants were interviewed.

f. Paper Manufacturing Industry -

All manufacturers were interviewed.  
All paper products assembly businesses were interviewed.

g. Glass Manufacturing Industry -

All businesses supplying for commercial or industrial use were interviewed.

h. Refrigeration Industry -

- 1) Commercial and Industrial companies were interviewed.
- 2) Ice Making Plants were interviewed.

i. Dairies -

Representative cross-section of all dairies were interviewed.

j. Explosives Industry -

Suppliers and consumers, both current and potential, were interviewed.

k. Chemical Industry -

- 1) Manufacturers were interviewed.
- 2) Representatives were interviewed.

l. Importers and Representatives -

A representative cross-section of all importers, agents and representatives handling a variety of products on the Venezuelan market not included in the General Industry breakdown above were interviewed.

The contact interview phase of the survey was more productive of highly significant information than any other phase.

The extreme importance of this phase in terms of results produced is evidenced by the fact that the PHAIS work and research team conducted a total of one hundred and twenty (120) contact interviews within the industries named above, travelling to the main industrial areas of Maracaibo, Barquisimeto, Valencia, Puerto

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Cabello, Maracay, and Caracas.

Contact interviews were conducted in Caracas with the appropriate personnel of those industries which have their Actual Operations in the industrial centers of the Oriente.

2 - In the United States -

Contact interviews were also carried out in the United States among those industries whose current and potential use of ammonia and ammonia-bearing products could not readily be determined from the field work carried out in Venezuela.

These contact interviews in the U. S. were carried out to determine the potential demand of those industries which are currently operating in Venezuela on a reduced scale or not operating at all, for ammonia and ammonia bearing products, assuming ammonia would be available locally.

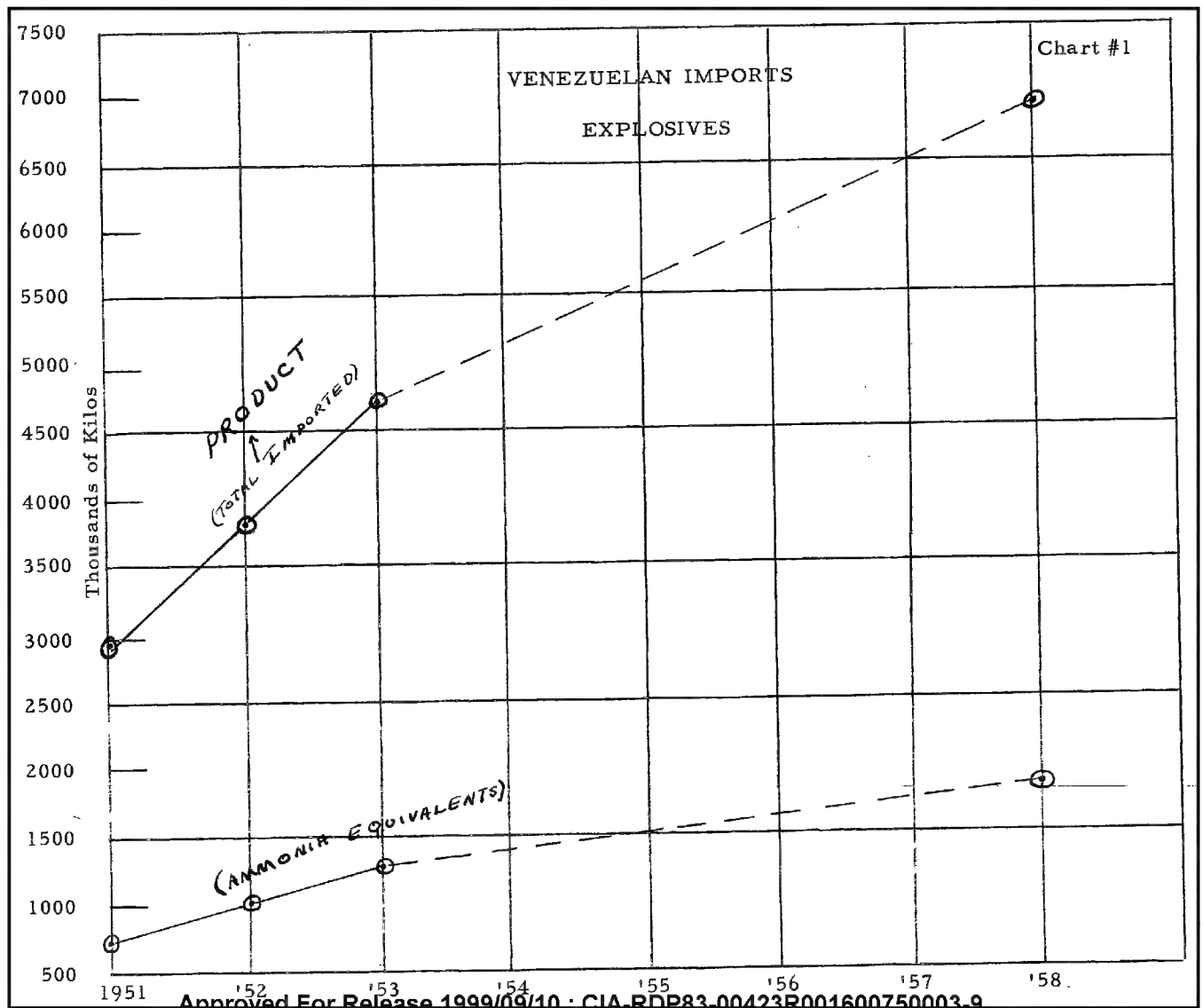
C - Analysis and evaluation of the information collected from sources listed in A and B above, of product by Industry.

### EXPLOSIVES

The items which account for the largest amount of ammonia consumption are those in the explosives classification. This classification includes dynamite, TNT, nitroglycerin, smokeless powder and miscellaneous items listed under the heading of pyrotechnics. Dynamite is by far the largest item in this grouping, amounting to approximately 90-95% of those imports generally lumped under the heading of explosives. It is estimated that in 1953, dynamite represented some 1,300 metric tons in equivalent ammonia content.

Based on the survey conducted, it was found that, if ammonia were available locally, and suitable conversion facilities existed, 1,600-1,900 metric tons year of ammonia could be utilized for the manufacture of explosives in five years time.

Chart #1 shows the trend of explosive-importations since 1951.



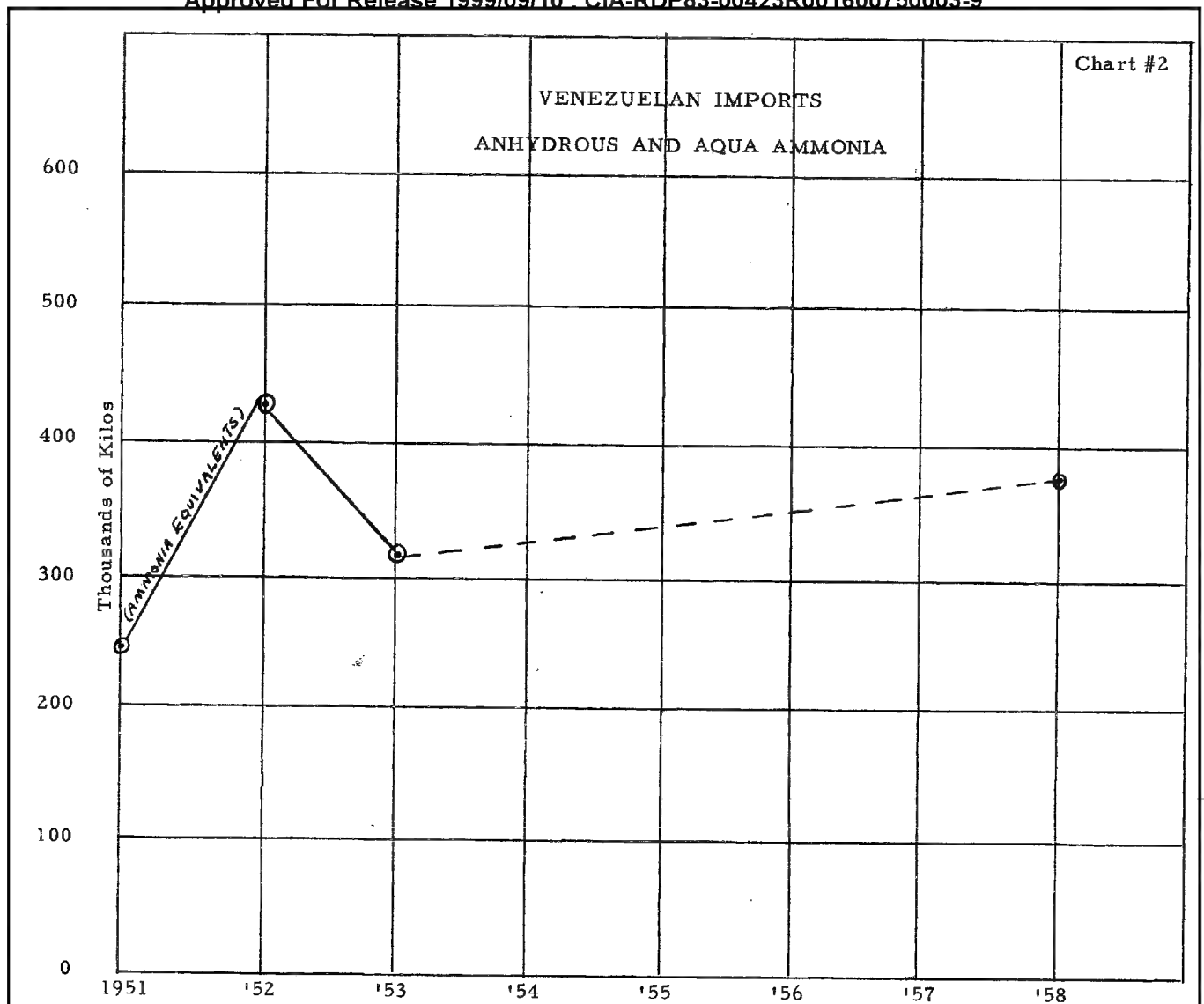
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ANHYDROUS AND AQUA AMMONIA

Use of anhydrous and aqua ammonia as such, in 1953, amounted to 313.9 metric tons, in terms of ammonia.

Almost without exception, this ammonia was used by the refrigeration industry, either for direct use in commercial refrigeration units or for use by a variety of industries in the making of ice, either for their own use or for sale to outside concerns or a combination of both. An insignificant amount of ammonia is utilized by the pharmaceutical industry and by the metal industry. The pharmaceutical manufacturing industry's use may never amount to an appreciable quantity, however, the metal treating industry represents an outlet, dependent on the development of the industry, which could be increased to approximately 6% of the total industrial consumption of ammonia. No appreciable quantity was used in agriculture, and no estimates of future agricultural consumption are included in this industrial report.

Graph #2 represents the trends of anhydrous and aqua ammonia imports, since 1951.



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UREA

In 1953, 283 metric tons of Urea (80 metric tons of equivalent Ammonia) were reported as being imported. However, from PHAIS's investigations of uses for Urea, it was found that use during 1953 was close to 1100 metric tons. The discrepancy in figures is most likely due to the fact that Urea may also be imported under other import classifications probably grouped under general category names, in which case, it is not necessary to declare Urea importations per se. The discrepancy, too, could be as a result of the use of urea in 1953 which was imported in previous years. It is indicated, however, that as a result of the survey, the former reason is more likely correct.

In other countries, one of the main uses of Urea is as a fertilizer. However, in Venezuela, Urea as a fertilizer has not gained much acceptance. The two main uses of Urea on the Venezuelan market are as a chemical processing agent in the textile industry and as an additive to animal feed. The consumption of the majority of the Urea imported is estimated to be about equally divided between these two industries.

A representative cross-section of the major textile manufacturers were contacted by the PHAIS market research team. The textile industry reported that approximately 500 to 600 tons of Urea were consumed within the industry in 1953. In terms of Ammonia equivalents this 500 to 600 tons of Urea is equivalent to 279-335 metric tons of Ammonia.

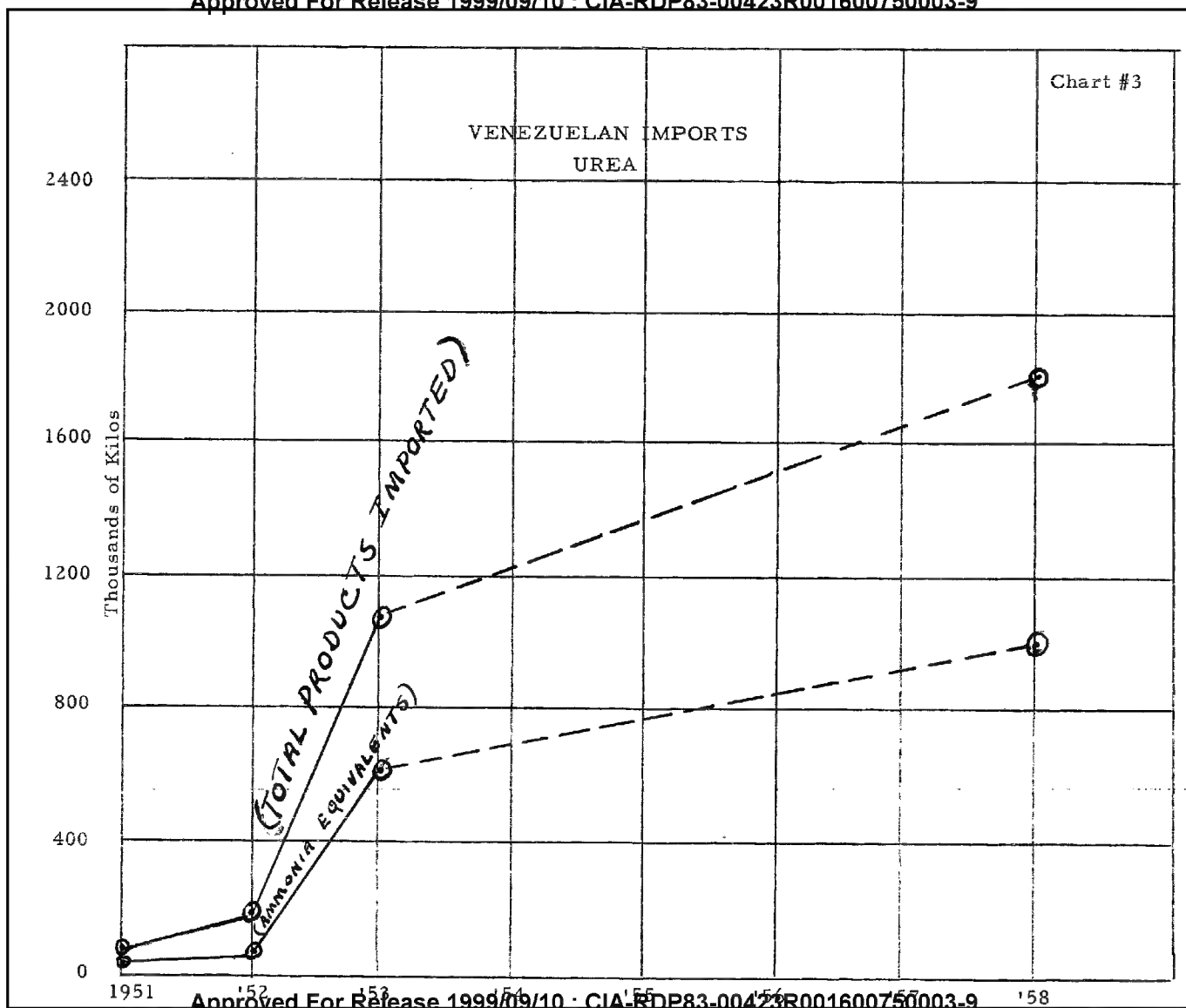
The information gathered from the main animal feed manufacturers visited and questioned indicates that their 1953 consumption was in the order of 500 to 600 tons.



In terms of Ammonia equivalents this equals 279-335 metric tons of Ammonia.

If Ammonia were available locally and Urea were manufactured in Venezuela it was found that, over the next five years, Urea consumption for these two main users would increase from the estimated average consumption of around 1,100 tons per year to a maximum of 1,800 tons per year, excluding of course, possibilities of use as a fertilizer.

Chart #3 shows the trend of Venezuelan Urea imports from 1951 through 1958.



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AMMONIA SALTS

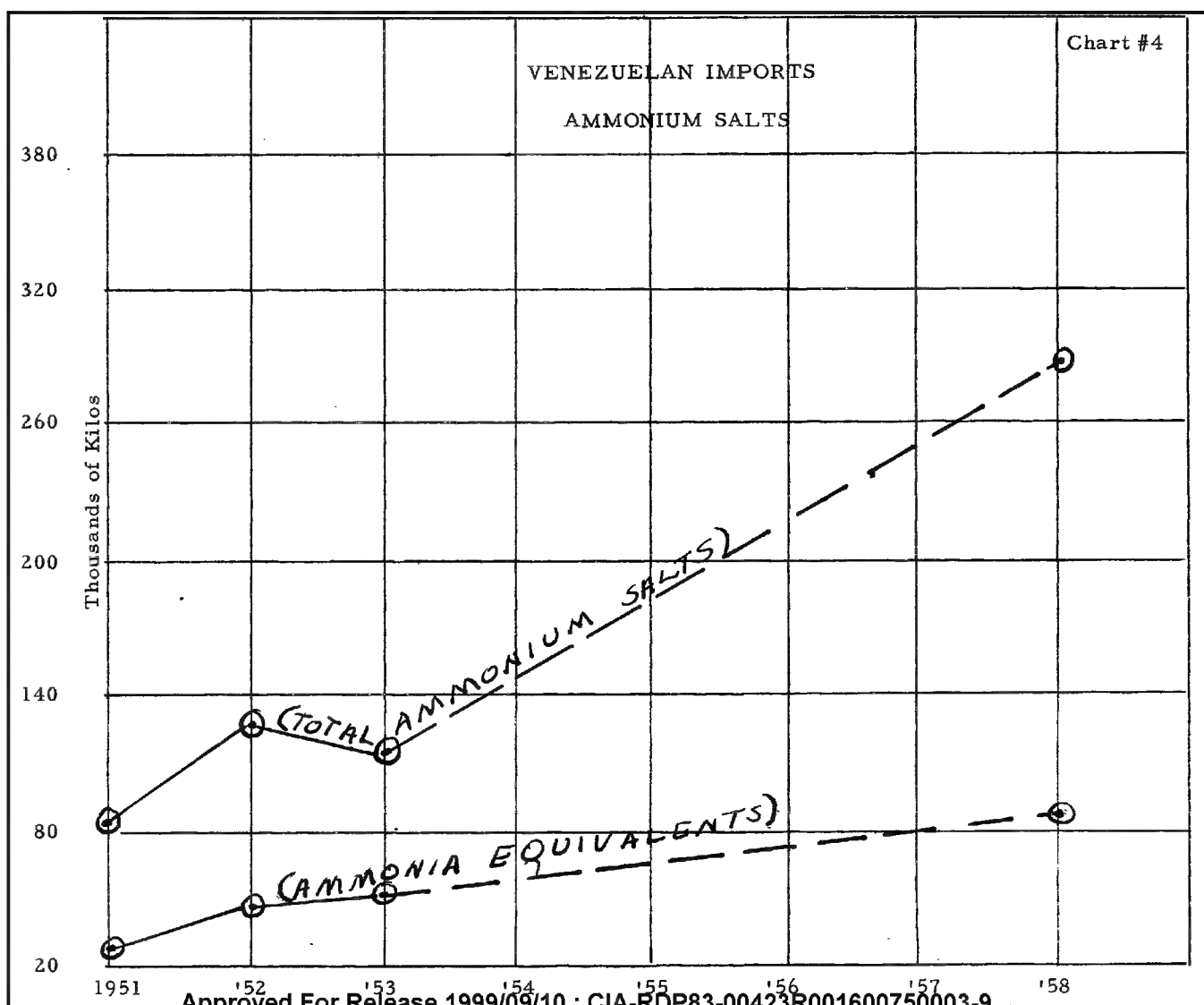
The importation of ammonia salts in 1953 amounted to 112.5 metric tons according to Venezuelan import statistics.

This general category includes ammonium chloride, used for dyeing processes in the textile industry; ammonium persulfate, ammonium hyposulfite and minor amounts of other salts. The percentage of equivalent Ammonia content of these and other items in this category varies between 16% and 34%. From PHAIS's investigation and analysis the equivalent Ammonia content has been set at 30% for all these products, which is a fair average to assign this category, according to the study. This gives in total, an Ammonia equivalent content of 33.7 metric tons. In light of the investigations it seems that this total is more likely represented by 35 tons of equivalent Ammonia. The main item in terms of the total figures is ammonium chloride, which represents over 50% of the products grouped in this classification. The remainder is divided among other products spread throughout the many industries in minor amounts.

The photographic industry utilizes a portion of the total import figure in the product ammonium hyposulfite.

Chart #4 indicates trends of imported Ammonia salts over the past years.

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NITRIC ACID

According to the Venezuelan Ministry of Statistics, the amount of nitric acid imported for 1953, was 82.2 metric tons of 60% material or 13.3 metric tons of equivalent Ammonia.

Nitric acid, a versatile chemical, has a multitude of uses:

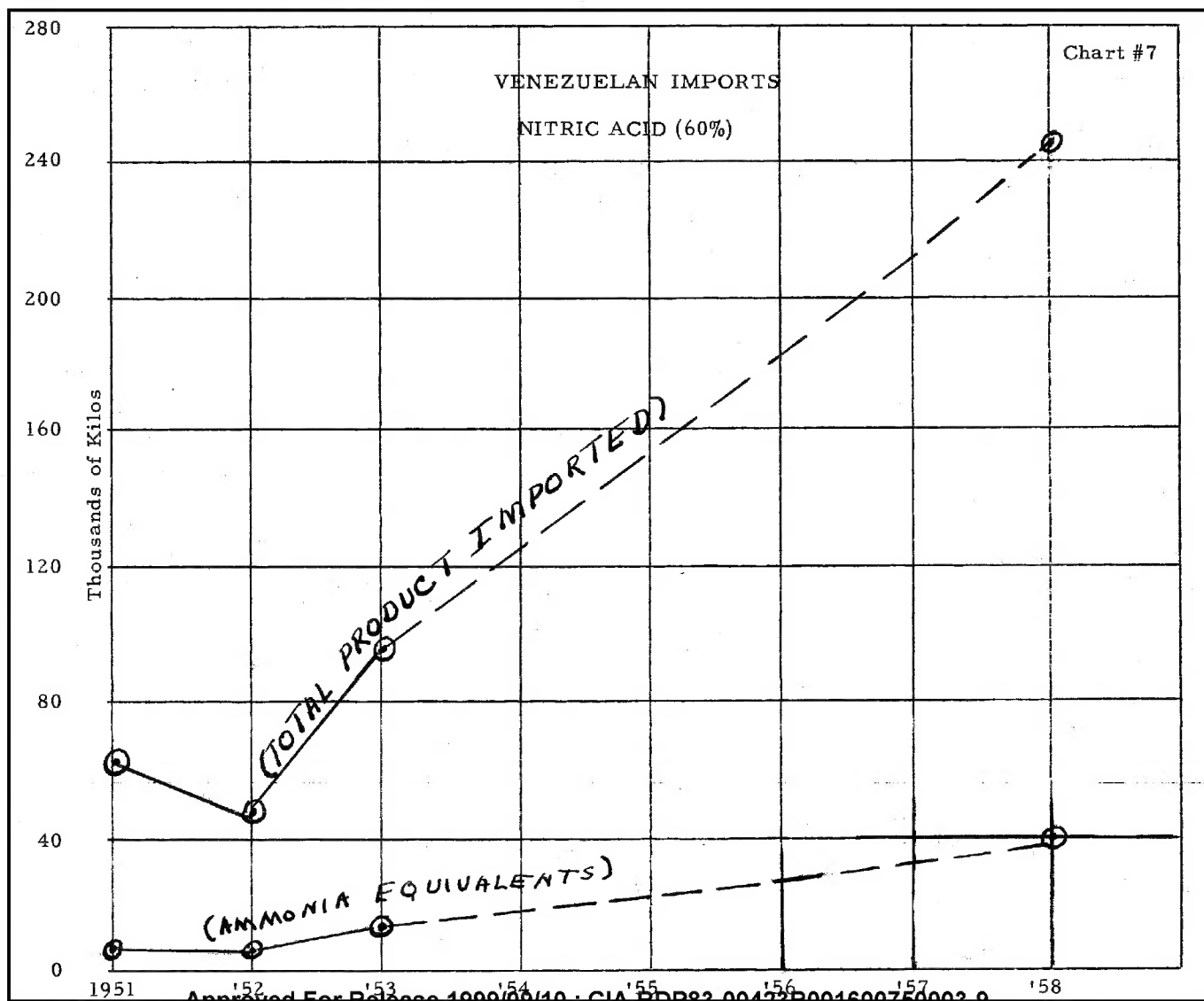
1. In the manufacture of phosphoric acid
2. As a chemical processing agent in the manufacture of rayon
3. As a chemical processing agent in manufacture of rubber and rubber substitute products
4. As a laboratory reagent and metallurgical solvent
5. As a chemical processing agent aiding in some dyeing processes
6. In etching and photoengraving processes

Nitric acid use is spread over almost all the industries, no one industry using large amounts. It is sold in Venezuela through local representatives of various chemical companies in the U. S., Germany, Holland, Italy and, to a minor extent, Great Britain.

Nitric acid consumption in future years would be tied closely to the development and growth of the industries now using it in minor quantities.

Allowing for normal industry growth it is indicated that in about 5 years between 25 and 40 metric tons per year of Nitric Acid, expressed in terms of Ammonia equivalents, would be consumed.

Chart #5 depicts the trends of Venezuelan nitric acid importation since 1951.



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SECTION IV - SUMMARY

In summary, according to the studies of the PHAIS market research staff, the amount of equivalent ammonia consumed in industry in Venezuela during 1953 is estimated to be 2,280 metric tons.

If ammonia were available locally, the findings indicate that within the next 5 years an industrial market outlet will have been developed for approximately 3,400 metric tons of ammonia per year.

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APPENDIX

Chart #6 presents graphically the statistical information gathered from the statistical department of the Ministry of Development and presents it in terms of kilograms of total product and also kilograms of total ammonia equivalents imported each year from 1949 through 1953.

The figure of 1,741 metric tons of ammonia equivalents imported 1953, represent the ammonia equivalents in importations of:

1. Anhydrous Ammonia
2. Aqua Ammonia
3. Urea
4. Nitric Acid
5. Ammonia Salts
6. Explosives



CHART #6

VENEZUELAN IMPORTATIONS \* - INDUSTRIAL AMMONIA PRODUCTS

|                         | 1953             |                       | 1952             |                       | 1951             |                       | 1950             |                       | 1949             |                       | Total                 |
|-------------------------|------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|-----------------------|
|                         | Total<br>Product | Equivalent<br>Ammonia | Total<br>Product | Equivalent<br>Ammonia | Total<br>Product | Equivalent<br>Ammonia | Total<br>Product | Equivalent<br>Ammonia | Total<br>Product | Equivalent<br>Ammonia | Ammonia<br>Equivalent |
| Anhydrous Ammonia       | 290,755          | 290,755               | 421,300          | 421,300               | 243,037          | 243,037               | 185,112          | 185,112               | No Data          |                       | 1,140,204             |
| Aqua Ammonia -<br>29.4% | 79,081           | 23,224                | 71,154           | 20,919                | 42,306           | 12,437                | 31,486           | 7,706                 | No Data          |                       | 64,286                |
| Urea                    | 282,528          | 79,969                | 167,870          | 47,491                | 73,732           | 20,865                | 127,855          | 36,197                | 2,522            | 725                   | 185,247               |
| Nitric Acid (60%)       | 82,266           | 13,335                | 46,725           | 7,575                 | 52,481           | 8,482                 | 39,604           | 6,441                 | No Data          |                       | 35,833                |
| Ammonia Salts           | 112,531          | 33,759                | 132,780          | 39,834                | 88,838           | 26,651                | No Data          |                       | No Data          |                       | 100,244               |
| Explosives              | 4,759,041        | 1,300,000             | 3,887,283        | 1,055,000             | 2,967,632        | 805,000               | 1,904,602        | 516,000               | 1,847,443        | 500,000               | 4,176,000             |
| Total                   | 5,606,202        | 1,741,042             | 4,727,112        | 1,592,119             | 3,468,026        | 1,116,472             | 2,288,659        | 751,456               | 1,849,965        | 500,725               | 5,701,814             |

N.B. All figures in kgs.

\* Statistics from Venezuelan Ministry of Statistics.